

Sixty years since the opening of Perth's Narrows Bridge — an engineering feat that transformed the city

ABC Radio Perth / By Emma Wynne

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The Narrows Bridge 60 years on — double in size and feeding into large freeways.

For 60 years it has been the main link between Perth's north and south, carrying almost 200,000 vehicles a day, but few realise what an engineering marvel the Narrows Bridge is.

That is the view of Duncan Robinson, an adjunct senior lecturer in engineering at Edith Cowan University, who has dedicated himself to researching the history of the bridge and its impact on Perth.

"It's a bit more than a bridge," he said.

"I reckon it an absolute wonder that every day for 60 years it's functioned perfectly.

"It's woven into the fabric of West Australian society."



Engineer Duncan Robinson is fascinated by the engineering and social history of the bridge. (ABC Radio Perth: Emma Wynne)

The creation of the six-lane bridge at the point where the Swan River narrows between the city and South Perth transformed the capital, allowing for the creation of the freeways north and south and the urban sprawl along the coast.

"If it wasn't there it's just unimaginable — it just wouldn't work, the city wouldn't work," Mr Robinson said.

It does not have the profile of the Sydney Harbour Bridge or the Golden Gate Bridge in San Francisco, because the State Government wanted a design that did not intrude on the landscape.



People watch the official opening of the Narrows Bridge from Kings Park, 13 November 1959. (Supplied: State Library of Western Australia)

"The brief was they wanted a bridge that didn't detract from the view of King's Park from the city or the vista from Kings Park to the city," Mr Robinson said.

But beneath its concrete exterior is a piece of advanced engineering and a driver of huge urban development in Perth.

A city built for cars

In the 1950s Perth was growing, and so was car ownership.

The primary link between the city's north and south was the causeway at East Perth and the Canning Highway to Fremantle.

In 1952 a new Causeway Bridge had been built but by 1954 traffic surveys showed the use was unsustainable and the Government began serious planning for a bridge at the Narrows.



Guests walk across the Narrows Bridge on the day it opened on November 13, 1959.

(Supplied: State Library of Western Australia)

At the same time, BP approached the State Government about putting a refinery south of Perth at Kwinana — a development that fuelled road building in a number of ways.

"Until that time all petroleum products had to be imported to Western Australia and the fact that the refinery was there meant the fuel was cheaper, so more people had cars," Mr Robinson said.

"The other thing about the refinery was that as you do the distillation process for petroleum the last fraction is bitumen.

"Up until that time the only bitumen in WA had to come in 44-gallon [200 litre] drums — now you could put it straight in the back of the tankers so the road manufacturing was made so much easier."

Building on slimy ground

The biggest challenge was not actually to build the bridge, but to create stable ground on which to build it on the northern side at Mounts Bay by reclaiming 17 hectares from the river.



Reclamation begins on 43 acres of land at Mounts Bay in the early 1950s. (*Supplied: Engineers Australia*)

"Mounts Bay was a backwater, literally," Mr Robinson said.

It took four years to reclaim the sludgy, silty land by dredging shells and sand from Melville Water, with one dredging machine working double shifts to layer 3.4 million cubic metres of fill.

"The reason it took such a huge volume is that the bottom of Perth water is a sludgy, slimy mess," Mr Robinson said.

"As you put the sand on top, water is driven out, but the volume is so great you've got to put metres and metres of fill on top to get the thing to consolidate."

Noisy engineering

The Main Roads WA used the four years to send their senior engineer to the United Kingdom and United States to research the best bridge designs.



Construction of the Narrows Bridge circa 1957. The fabrication yard was at Mill Point at South Perth. (Supplied: Engineers Australia)

In April 1957 the contract to build the bridge was awarded to a joint venture between a Danish firm, Christiani and Nielsen (which had experience in similar projects), and local a engineering firm, J. O. Clough & Son.

A large building yard was set up on the South Perth foreshore.

"During construction it would have been a noisy place," Mr Robinson said.

Unusually, each of the 10-foot (3m) concrete segments were fabricated onsite and there were also 180 supporting piles that had to be driven deep into the riverbed, through the silt to firmer ground, using a steam engine, which was a noisy process.



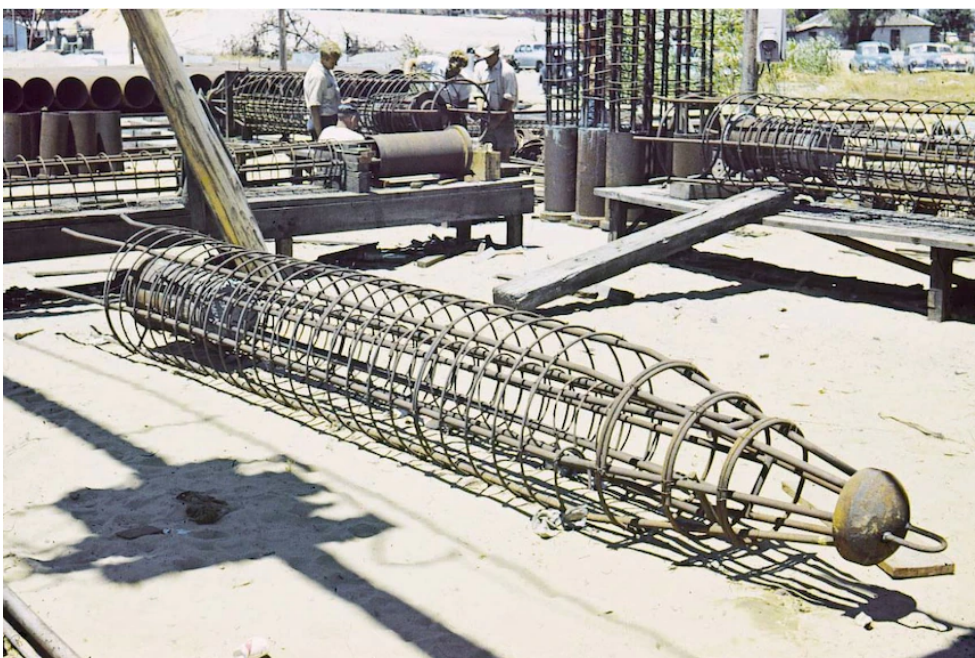
All the concrete for the Narrows Bridge was mixed and fabricated on site. (*Supplied: Engineers Australia*)

"Basically what [the piles] were was a steel casing with a tapered end just like a tent peg," Mr Robinson said.

"They had a 10-tonne hammer which was raised by the steam engine, that lifted up and dropped. The pile would be driven [deep into the riverbed], and that's why it would be so noisy in South Perth.

"Each of the [concrete] segments were cast in a prefabrication yard on reclaimed land in South Perth.

"Each section, after it was cast, would be trundled out on old railway rolling stock and then a gantry crane would pick it up and place it."



The Gambia piles were like giant tent pegs, hammered into the riverbed with a 10-tonne hammer. (*Supplied: Engineers Australia*)

Complicating the project further was that the bridge builder had to regularly move their rails to let the Rottnest Ferry through.

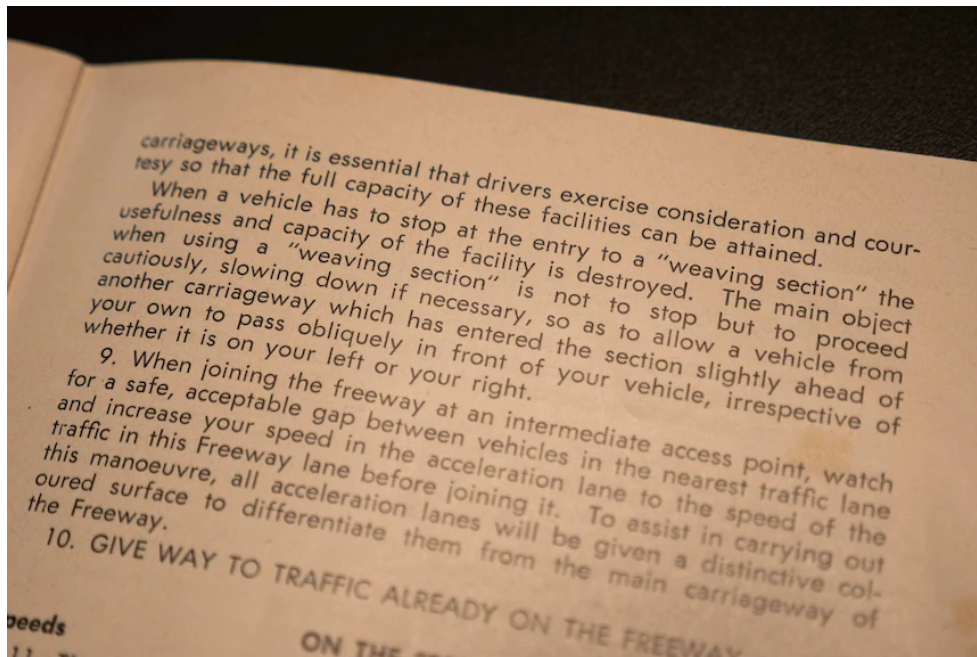
When Perth had to learn to merge

When the bridge was opened on November 13, 1959 it was the largest precast, prestressed concrete bridge in the world and had a speed limit of 50 miles per hour (80 kilometres per hour).

In the official opening booklet, that was sold to mark its opening, Main Roads WA included detailed advice on how to drive on the bridge, including a manoeuvre that still draws complaints from drivers — merging, or as the booklet called it, weaving:

"When a vehicle has to stop at the entry to a 'weaving section' the usefulness and capacity of the facility is destroyed."

In the decades since the bridge has been built, the tangled Narrows interchange has been added, the freeways have grown to the north and south, and traffic has swelled.



Narrows Bridge booklet from 1959 with advice to drivers on weaving (merging). (ABC Radio Perth: Emma Wynne)

One bridge becomes three

By the 1990s, the southern suburbs had ballooned thanks to the bridge and the freeway, and the bridge struggled to cope, becoming a large bottleneck in peak hour.

The solution was a second, identical bridge which was completed in 2001 on the western side of the original bridge.

In 2005 a third bridge was added down the centre for the railway line to Mandurah.



The original 1959 bridge is on the left, the railway bridge runs down the centre. (ABC Radio Perth: Emma Wynne)

Despite its age, the original Narrows Bridge is still as strong as ever and Mr Robinson has used the bridge as an example to his engineering students.

"We try and teach the students innovation and the only way you can do that is by examples," he said.

"You've got to look at classic engineering case studies to try and pass on that innovation."

Asked if he believed the bridge would still be there in another 60 years, Mr Robinson was confident: "I genuinely do."